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ABSTRACT

The study empirically examines the effects of economic and non-economic variables on college persistence by presenting a causal model that relies on both economic theory and V. Tinto's Student Integration Model in order to enhance an understanding of the role of finances on the college persistence process. Analyses conducted upon a sample of 466 college students attending a large public urban institution examined the effects of ability to pay on measures of academic integration, social integration, institutional commitment, goal commitment, intent to persist, and persistence. Findings were largely supportive of the Student Integration Model, and indicate that financial variables moderate the effects of several variables in the causal model. (Author/JDD)

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DETERMINANTS OF PERSISTENCE: THE INCLUSION AND TESTING OF ABILITY TO PAY FACTORS IN TINTO'S MODEL OF STUDENT ATTRITION

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PROPOSAL ABSTRACT

The study empirically examines the effects of economic and non-economic variables on college persistence by presenteing a causal model that relies on both economic theory and Tinto's Student Integration Model in order to enhance an understanding of the role of finances on the college persistence process. More specifically, a quantitative model is tested via Linear Structural Equations that incorporates the major constructs of the Student Integration Model while making explicit the potential role of financial variables on the college persistence process. The research design is predictive, and analyses are conducted upon a sample of 466 college students who were attending a large public urban institution in the spring of 1989. While the results are largely supportive of the Student Integration Model, findings also indicate that financial variables moderate the effects of several variables in the causal model.Implications of the study findings for theory, policy analysis and research on financial aid are discussed.

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This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Red Lion-Jantzen Beach in Portland, Oregon, November 1-4, 1990. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

DETERMINANTS OF PERSISTENCE: THE INCLUSION AND TESTING OF ABILITY TO PAY FACTORS IN TINTO'S MODEL OF STUDENT ATTRITION

Quantitative studies of college student persistence have typically yielded inconsistent results and have confusing, if not contradictory, explanations of the variance in departure behavior. These findings may be due to either: (1) the omission of variables from quantitative models, (2) misspecification of factors or (3) inconsistencies in the measurement of theoretical constructs from one study to the other. The purpose of this paper was to explore the effects of finances on the college persistence process by following the ability-to-pay model (Cabrera, Stampen & Hansen, 1990), while resting on better measures for the different constructs under analysis.

The ability-to-pay model builds upon several models of college persistence (Tinto, 1987; Bean, 1982; Nora, 1987) and presumes that finances, while affecting directly decisions to persist, moderates the effect of academic integration, social integration, goal commitment and institutional commitment. Considerable effort was put into the development of scales consistent with the theoretical framework and definitions of the constructs. Measures (survey items and scales) used in operationalizing critical factors in Tinto's model of college persistence were examined and tested for increased reliability and construct validity for the following intervening variables: (1) academic integration, (2) social integration, (3) institutional commitment, (4) goal commitment, (5) significant others' influence, (6) institutional prestige, (7) intent to

persist, (8) intent to transfer, and (9) ability to pay indicators.

THEORETICAL FRAMEWORK

To date, the most widely tested theoretical model of student persistence is Tinto's (1975, 1987) Student Integration Model. Tinto conceptualized persistence as a longitudinal process of interactions between the student and the academic and social components of the institution. The theory asserts that, other factors being equal, the academic and social components shape two underlying individual commitments: commitment to college completion and commitment to the institution itself. Accordingly, the stronger the goal commitment and/or the greater the level of institutional commitment, the greater the probability that a student will complete college.

The usefulness of the Student Integration Model as a framework to explore the effect of finances on college persistence is limited. Although the Student Integration Model indicates that ability to pay is important in shaping educational goals and in the selection of institutions, the theory is silent about the role of ability to pay once students enroll. Apparently, the justification for this omission seems to rest on studies indicating that aided students show no higher propensities to persist than do non-aided students (cf. Tinto, 1987, pp. 80-81). However, interpreting this finding as an indicator of the lack of effects of ability to pay is incorrect. Recent research on student aid has shown that non-aided students come from higher family income backgrounds as compared to need-

based aided students, and that student aid is heavily targeted to students from low-income families (Jackson, 1988; Stampen, 1985; Stampen & Cabrera, 1988). Further, these studies also indicated that student aid is effective in compensating for the disadvantage of low income by making low-income students as likely to persist as more affluent students (see Leslie & Brinkman, 1988; Murdock, 1987; Stampen & Cabrera, 1986, 1988). Consequently, these results actually support the view that ability to pay does affect college persistence.

In order to compensate for this deficiency, Cabrera, Stampen and Hansen (1990) advanced a model in which ability to pay was presumed to interplay with both institutional and individual variables in shaping withdrawal decisions. The model draws from the Student Integration Model, and findings concerning the role of finances (Voorhees, 1985; Metzner & Bean, 1987) and the effect of significant others (Bean, 1982; Nora, 1987).

Cabrera et. al's testing of the model on a national sample of college students attending four-year institutions, drawn from the High School and Beyond 1980 Senior Cohort (HSB), provided some support for the ability-to-pay model. Results indicated that ability to pay exerts direct effects on decisions to persist while slightly moderating the effect of goal commitment on the persistence criterion. However, Cabrera et. al found no evidence to support the presumed effects of ability to pay on academic integration and social integration, while the absence of indicators for institutional commitment prevented them from testing the effects of ability to pay on this construct.

Additional support for the model is provided by Mallette and Cabrera (1990) who found that finance attitudes, while controlling for the effects of academic integration, social integration, goal commitment and institutional commitment, discriminated between persisters and non-persisters among college freshman attending North Carolina State University.

Cabrera et. al were restricted by the quality of the surrogates for the different constructs. Consequently, they suggested that future research on the ability-to-pay model should be based on instruments consistent with the theory instead of relying on "ad-hoc" instruments such as those contained in the High School and Beyond Data Base. Accordingly, the purpose of this study is to test the predictive validity of the ability-to-pay model (see Figure 1) while relying on instruments more consistent with the nature of the construct under analysis.

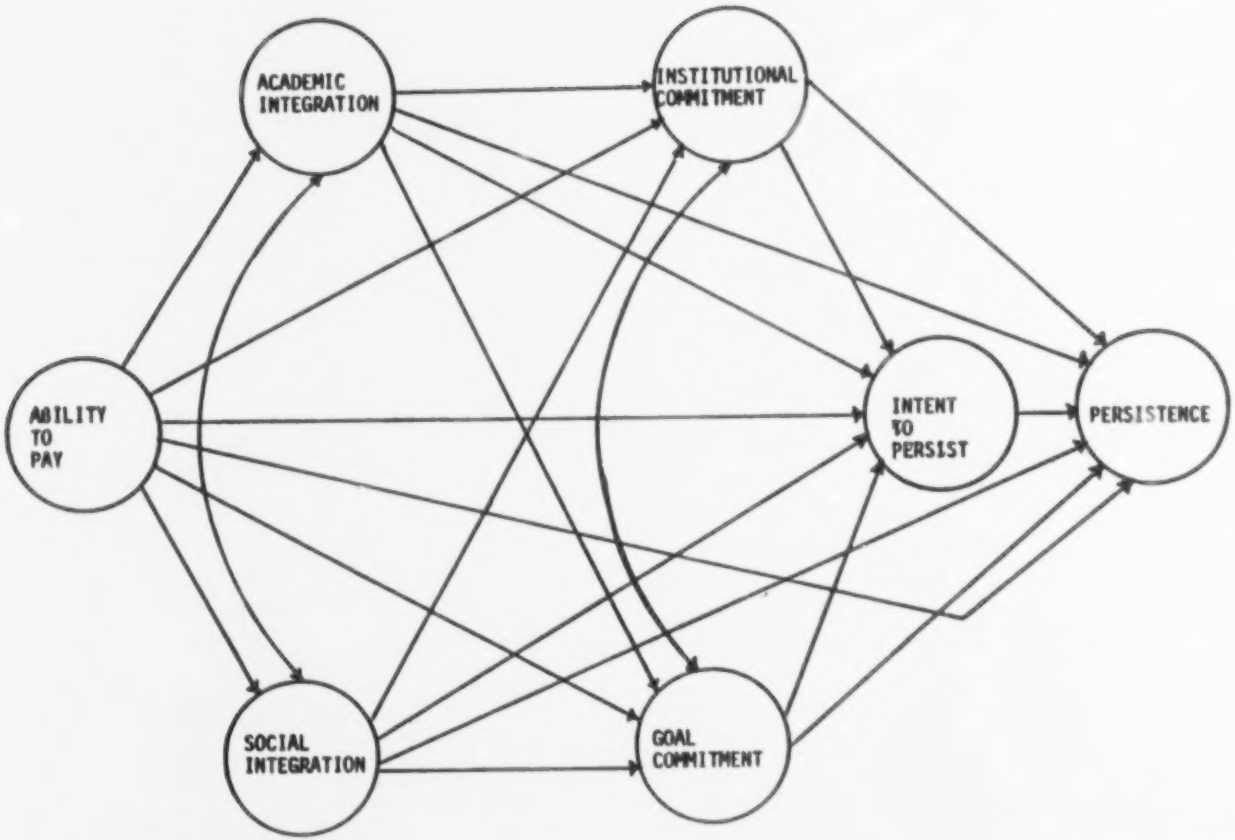
RESEARCH DESIGN

Subjects and Procedures

A longitudinal research design was used. The student population was drawn from the fall 1988 entering freshman class at a large southwestern urban institution. Since the Student Integration Model relates more to traditional students, only first-time freshmen who were United States citizens, under twenty-four years of age, and not married were selected. The number of freshmen meeting these criteria was 2,459.

In April of 1989, freshmen meeting these criteria were mailed a questionnaire containing 79 items. These items were selected from several instruments developed by Bean (1982, 1985),

Figure 1. Hypothesized causal model.



Metzner and Bean (1985), Pascarella and Terenzini (1979, 1980), and Nettles, Gosman and Theony (1985). The literature on organizational behavior was also consulted to derive additional items. Two items assessing affinity of values with students and faculty-academic advisors were included to measure the construct Values. Although a review of the literature on institutional commitment indicated that affinity of values was a component of Institutional Commitment (see Mowday, Steers & Porter, 1979), this dimension was not reflected in the original Pascarella and Terenzini's (1980) instrument. The literature on organizational behavior (Dunham, 1984) was also consulted to derive an additional item to measure goal importance. Student college transcripts and institutional financial aid records were accessed to determine unmet need, an objective indicator of ability to pay, and GPA at the end of the 1989 spring semester. An initial survey and a follow up survey yielded 466 usable surveys.

Comparisons of characteristics between students responding to the questionnaire versus non-respondents indicated that the sample mirrored the target population in most factors. The sample slightly overrepresented the proportion of whites (63.9% versus 58.6%), slightly overrepresented average SAT scores (1028 versus 995), and slightly underrepresented the spring attrition rate (15.5% versus 17%).

Data Analysis

A two step strategy was employed to test the model. Prior to testing the structural model, the measurement properties of each construct were assessed via exploratory and confirmatory factor

analyses. The most representative items, in terms of factor loadings, and most valid ones, in terms of correlations across indicators of other scales, were retained to test the model. This strategy made it possible to both control for nuisance variance and determine the extent to which observed variables constituted reliable and valid manifestations of the latent constructs consistent with the theoretical framework in the study.

Structural equation modeling via LISREL VII (Joreskog & Sorbom, 1989) was employed to estimate the parameter estimates of the structural and measurement models of the hypothesized relationships among the constructs. Although previous research has treated persistence (categorical in nature) as a continuous variable when testing Tinto's model of college persistence, it was decided to operationally define the persistence criterion as a dichotomous variable and employ PRELIS (Joreskog & Sorbom, 1989) to compute polyserial correlations. PRELIS enabled the estimation of the correct correlations between ordinal and continuous variables (see Table 1) and provided an estimate of the asymptotic covariance matrix under arbitrary non-normal distributions (Browne, 1982, 1984). Because polyserial correlations were used, the asymptotic covariance matrix provided by PRELIS was analyzed via a weighted least square (WLS) solution. The WLS method produces asymptotically correct standard errors and X^2 values under non-normality when one or more of the observed variables are ordinal (see Joreskog & Sorbom, 1989).

Table 1. Listwise Polyserial Correlations for All Single and Multiple Indicators of Latent Constructs.

Latent Constructs and Multiple Indicators		Academic Integration			Social Integration		Institutional Commitment			Goal Commitment		Intent to Persist	Persistence	Finance Attitudes	
		X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	Y1	Y2
Academic Integration	X1	1.000													
	X2	.503	1.000												
	X3	.468	.282	1.000											
Social Integration	X4	.078	.284	.063	1.000										
	X5	.150	.367	.055	.727	1.000									
Institutional Commitment	X6	.138	.319	.032	.252	.236	1.000								
	X7	.213	.450	.065	.294	.340	.627	1.000							
	X8	.207	.413	.031	.311	.366	.534	.832	1.000						
Goal Commitment	X9	-.029	.214	.021	.115	.101	.348	.257	.279	1.000					
	X10	.113	.309	.060	.181	.194	.327	.303	.298	.716	1.000				
Intent to Persist	X11	.177	.282	.175	.208	.188	.404	.601	.558	.328	.354	1.000			
Persistence	X12	.299	.253	.378	.115	.112	.105	.291	.264	.205	.288	.577	1.000		
Finance Attitudes	Y1	-.142	-.132	-.134	-.115	-.090	-.157	-.244	-.224	-.028	-.113	-.230	-.151	1.000	
	Y2	-.151	-.090	-.112	.084	.053	-.081	-.054	-.018	.067	-.079	-.050	-.172	.406	1.000

Coefficients >.10 are significant at $p<.05$ for 431 df.

RESULTS

To estimate the construct validity of the forty-five items selected for the different constructs, a principal component factor analysis with varimax rotation was performed. The factor solution accounted for 68.1 percent of the variance observed. Table 2 displays the factor loadings and reliabilities for items and scales comprising the different latent constructs in the hypothesized causal model. Six of the factors identified in the factor analysis were similar in structure and item composition to those reported by Pascarella and Terenzini (1979, 1980) with two exceptions. One indicator of Interactions with Faculty was found to cross-load with indicators of Faculty Concern, while one indicator of Academic and Intellectual Development cross-loaded with indicators of Goal Commitment. Ability to Pay indicators loaded into a single factor. Results of the exploratory factor analysis were replicated by a series of confirmatory factor analyses performed on each construct.

Of the five items used to measure Academic Integration, only two items from the Academic and Intellectual Development scale correlated with GPA, a cognitive indicator of Academic Integration. Based on loadings and validity coefficients, twelve items were retained to measure the different constructs in the model. Two items were retained to measure the non-cognitive component of Academic Integration - anticipation of academic performance (X1) and satisfaction with academic experiences (X2). The cognitive component for Academic Integration was assessed via GPA (X3). Social Integration was measured by two items -

Table 2. Factor Loadings and Alpha Reliabilities for Variables in the Structural Model.

Latent constructs	Variables (scales)	Number of Items	Range of loadings	Cronbach's Alpha
Academic Integration	Formal contacts with faculty & academic staff	3	.74 to .80	.82
	Faculty & academic staff concern	3	.75 to .77	.78
	Interactions with faculty & academic staff	5	.38 to .82	.78
	Academic & intellectual development	4	.40 to .76	.72
	Informal contacts with faculty & academic staff	3	.54 to .68	.61
Social Integration	Peer Group relations	4	.72 to .85	.85
Institutional Commitment	General	8	.50 to .76	.88
	Affinity of values	2	.77 to .78	.60
Goal Commitment	Certainty of major	2	.87 to .90	.87
	Goal importance	2	.65 to .71	.69
Intent to Persist	General	3	.61 to .79	.73
	Intent to Transfer	2	.69 to .82	.54
Finance Attitudes	General	2	.76 to .81	.53
Significant Others	General	2	.44 to .79	.32

developing close personal relationships with peers (X4) and ease in meeting and making friends (X4). Indicators of Institutional Commitment included: (1) securing future employment by attending respective institution (X6), (2) certainty of institutional choice (X7), and (3) right decision in attending institution (X8). Goal Commitment was measured by two items - importance of getting a college degree (X9) and importance of completing a program of study (X10). Intent to re-enroll in the fall of 1989 (X11) provided a measure of Intent to Persist. Two items were employed to measure Finance Attitudes - satisfaction with financial support received (Y1) and perceptions of financial difficulty (Y2). Although unmet need (Y3), an objective indicator of Ability to Pay, was found to have the highest correlations with all indicators of the latent constructs in the causal model (see Table 1), this variable was not employed in the estimation of the model. The number of cases with information on unmet need (280), although representative of the population, was far below the number needed (360) to compute the listwise polyserial correlation matrix.

Both the measurement and structural model parameter estimates of the quantitative model tested in the present study are displayed in Table 3. LISREL estimates (weighted least squares) indicate the degree of relationship of the manifest variables to their underlying constructs and the amount or degree of relationship among the structural factors in the hypothesized causal model. The factor loadings for the measurement model and the standardized parameters for the structural models are each

Table 3. Factor-Standardized Parameter Estimates: Measurement and Structural Models.

Factors and Variables	Factor Loading	Unique Variance
Measurement Model		
Ability to Pay		
Satisfaction with financial support	.872	.200
Perceptions of financial difficulty	.394	.862
Academic Integration		
Anticipation of academic performance	.535	.210
Satisfaction with academic experiences	.979	.036
Spring 1989 GPA	.376	.856
Social Integration		
Developed close personal relationships	.802	.359
Ease of meeting and making friends	.897	.198
Institutional Commitment		
Secure future employment	.640	.585
Certainty of choice	.943	.100
Right decision in attending institution	.861	.251
Goal Commitment		
Importance of college degree	.753	.434
Importance of completing program of study	.934	.131
Intent to Persist		
Likely to re-enroll at same institution	.989	.010
Persistence		
Re-enrollment at institution	.990	.010

Causal Model

Standardized parameters	Standard weight
γACADINT,ABIL	-.216*
γINSTCOMM,ABIL	-.144*
γINTPER,ABIL	-.061
γGOALCOMM,ABIL	-.087
γSOCINT,ABIL	-.058
γPERSIS,ABIL	-.073
βINSTCOMM,ACADINT	.284*
βPERSIS,ACADINT	.218*
βGOALCOMM,ACADINT	.207*
βINTPER,ACADINT	.013
βINSTCOMM,SOCINT	.312*
βGOALCOMM,SOCINT	.140*
βINTPER,SOCINT	-.047
βPERSIS,COCINT	.001
βPERSIS,INSTCOMM	-.262
βINTPER,INSTCOMM	.554*
βINTPER,GOALCOMM	.167*
βPERSIS,GOALCOMM	.094
psiACADINT,SOCINT	.329*
psiINSTCOMM,GOALCOMM	.245*

subscripted to designate the relationships between latent variables. The factors in the structural model are represented by the following abbreviations: (1) ABIL=Ability to Pay, (2) ACADINT=Academic Integration, (3) SOCINT=Social Integration, (4) INSTCOMM=Institutional Commitment, (5) GOALCOMM=Goal Commitment, (6) INTPER=Intent to Persist, and (7) PERSIS=Persistence. Unique variances or residuals are included to report the amount of variance not explained by each indicator of the latent variables.

Integration Factors

The first and second structural equations in the quantitative model examined the effects of Ability to Pay, the only exogenous variable in the model, on measures of both Academic and Social Integration. The factor loadings for indicators of Ability to Pay were .872 (Satisfaction with Financial Support Received) and .394 (Perceptions of Financial Difficulty). The unique variance for both measures were .200 and .826, respectively. Although factor loadings for both indicators supported the use of these two variables as indicators of Ability to Pay, the .394 loading for Perceptions of Financial Difficulty would suggest that a better measure of the latent construct would be Satisfaction with Financial Support Received as a single indicator of Ability to Pay. The factor loadings for the three indicators of Academic Integration were .535 (Anticipation of Academic Performance), .979 (Satisfaction with Academic Experiences), and .376 (GPA). The unique variances for the three variables were .210, .036, and .856, respectively. The factor loading for GPA would suggest, again, that both Anticipation of

Academic Performance and Satisfaction with Academic Experiences would provide a more valid (and noncognitive) measure of Academic Integration. Deletion of GPA as an indicator of Academic Integration, however, would alter the conceptual meaning of the factor in the theoretical framework. It was believed by the authors that including GPA as a measure of Academic Integration would better reflect the conceptual framework in the study.

The factor loadings for measures of Social Integration in the second structural equation were .802 (Developed Close Personal Relationships) and .897 (Ease in Meeting and Making Friends). Unique variances for the two indicators were .359 and .198, respectively. Both the factor loadings and the unique variances supported the use of the two variables in measuring Social Integration.

The proportion of variance explained in Academic Integration by Ability to Pay was .047. In the second structural equation, the proportion of variance explained in Social Integration was merely .003. The exogenous variable (Ability to Pay) in the causal model, therefore, accounted for 4.7% of the variance in Academic Integration and .3% of the variance in Social Integration.

Institutional Commitment

The third structural equation examined the direct and indirect effects (through academic and social integration measures) of Ability to Pay on Institutional Commitment. Moreover, it also tested the direct effects of Academic and Social Integration on Institutional Commitment. The factor

loadings for measures of Institutional Commitment were .640 (Secure Future Employment), .943 (Certainty of College Choice), and .881 (Right Choice in Attending Institution). Again, the unique variances (.200, .010, .200, respectively) and factor loadings indicated that all three multiple indicators of Institutional Commitment were valid measures of the latent construct. The squared multiple correlation (R-SQ) for the third structural equation was .282. Academic Integration, Social Integration, and Ability to Pay accounted for 28% of the variance in Institutional Commitment. Students who were more academically integrated (β=.284) and more socially integrated (β=.312) at their institution and who perceived no difficulty in meeting their financial needs (γ=-.144) had higher levels of commitment to their institution. The T-values for all three variables in the structural equation were found to be significant (5.241, 6.943, and -3.077, respectively). An examination of the standardized LISREL estimates indicated that the largest direct effect on Institutional Commitment was exerted by Social Integration. The second largest impact was exerted by Academic Integration, the third by Ability to Pay.

Goal Commitment

The fourth structural equation hypothesized the direct effects of Academic and Social Integration, as well as the direct and indirect effects of Ability to Pay, on Goal Commitment. The factor loadings for each of the two multiple indicators of Goal Commitment, Importance of Attaining a Specific Educational Goal and Importance Attached to Completing a Program of Study, were

.793 and .934. Unique variances of .200 and .010 revealed that both indicators were good measures of Goal Commitment. The proportion of variance explained by the three variables in the structural equation was .088 or 9%. Only two, Academic Integration (ß=.207) and Social Integration (ß=.140), of the three variables hypothesized to have an effect on Goal Commitment were found to be significant. The standardized regression coefficient for the direct effect of Ability to Pay on Goal Commitment was not significant. Although measures of the degree of integration both socially and academically were found to have an impact on Goal Commitment, it should be noted that only 9% of the variance in the latent construct was explained by the two factors. Similar to the structural equation for Institutional Commitment, there were no structural paths hypothesized between Academic Integration and Social Integration and between Institutional Commitment and Goal Commitment.

Intent to Persist

Five variables (Academic Integration, Social Integration, Institutional Commitment, Goal Commitment, and Ability to Pay) were examined in the fifth structural equation for direct and indirect effects on Intent to Persist, a measure of how likely students were to re-enroll at the same institution (see Table 4). The factor loading for the single indicator of Intent to Persist was .989 with a unique variance of .010. The proportion of variance accounted for was .415. However, 42% of the variance was explained only by Institutional Commitment (ß=.534) and Goal Commitment (ß=.167). The parameter estimates for Academic

Table 4. Parameter Estimates for Intent to Persist and Persistence.

Variables	LISREL estimates (WLS)	Standardized coefficients
Structural Equation for Intent to Persist		
Ability to Pay	-.048	-.061
Academic Integration	.013	.013
Social Integration	-.052	-.047
Institutional Commitment	.581	.554*
Goal Commitment	.179	.167*
Squared multiple correlation for Intent to Persist: R^2=.415		
Structural Equation for Persistence		
Ability to Pay	-.058	-.073
Academic Integration	.220	.218*
Social Integration	.001	.001
Institutional Commitment	-.274	-.262
Goal Commitment	.099	.094
Intent to Persist	.612	.611*
Squared multiple correlation for Persistence: R^2=.387		

Integration (ß=.013), Social Integration (ß=-.047) and Ability to Pay (r=-.061) were found to have T-values less than 2.0. While there were no significant direct effects found for the three previously mentioned variables, the total effects of each one of the three variables on Intent to Persist were determined by examining the indirect effects that the three constructs exerted through Institutional Commitment and Goal Commitment. Excluding the nonsignificant direct effects and considering only significant direct and indirect effects for the five variables provided a better indication of how much of the total variance (42%) was attributed to each variable. Of the two direct effects, the largest impact on Intent to Persist was exerted by Institutional Commitment. Students who had higher levels of commitment to their institution and to attaining a specific educational goal were more likely to re-enroll at the same institution.

Persistence

The final structural equation examined the effects of one exogenous variable (Ability to Pay) and five endogenous variables (Academic Integration, Social Integration, Goal Commitment, Institutional Commitment, and Intent to Persist) on the dependent variable (Persistence), a measure of the students' actual re-enrollment in their second year. The squared multiple correlation for the structural equation was .387. The variables accounted for 39% of the explained variance in Persistence. The factor loading for the single indicator of Persistence was .990, the unique variance .010. Only two variables (Academic Integration and

Intent to Persist) had significant direct effects on Persistence (.218 and .611, respectively). The largest direct effect on Persistence was found for Intent to Persist with Academic Integration having the second largest direct effect. Significant indirect effects exerted on the dependent variable by Academic Integration, Social Integration, Institutional Commitment, Goal Commitment, and Ability to Pay are displayed in the following sequences of structural paths for each variable:

Ability to Pay

ABIL » ACADINT » INSTCOMM » INTPER » PERSIS

ABIL » INSTCOMM » INTPER » PERSIS

ABIL » ACADINT » PERSIS

ABIL » ACADINT » GOALCOMM » INTPER » PERSIS

Academic Integration

ACADINT » INSTCOMM » INTPER » PERSIS

ACADINT » GOALCOMM » INTPER » PERSIS

Social Integration

SOCINT » GOALCOMM » INTPER » PERSIS

SOCINT » INSTCOMM » INTPER » PERSIS

Institutional Commitment

INSTCOMM » INTPER » PERSIS

Goal Commitment

GOALCOMM » INTPER » PERSIS

The largest total effects (direct + indirect effects) exerted on Persistence were from Institutional Commitment (.338) and Academic Integration (.335). Table 5 displays the effect coefficients (total effects) for the six variables in the fifth

Table 5. Effect Coefficients for Significant Structural Paths in Causal Model.

Variables	Direct effect	Indirect effect	Total effect
Ability to Pay	t<2.0	-.122	-.122
Academic Integration	+.218	+.117	+.335
Social Integration	t<2.0	+.120	+.120
Institutional Commitment	t<2.0	+.338	+.338
Goal Commitment	t<2.0	+.102	+.102
Intent to Persist	+.611		+.611

structural equation.

Non-Causal Relationships in the Structural Model

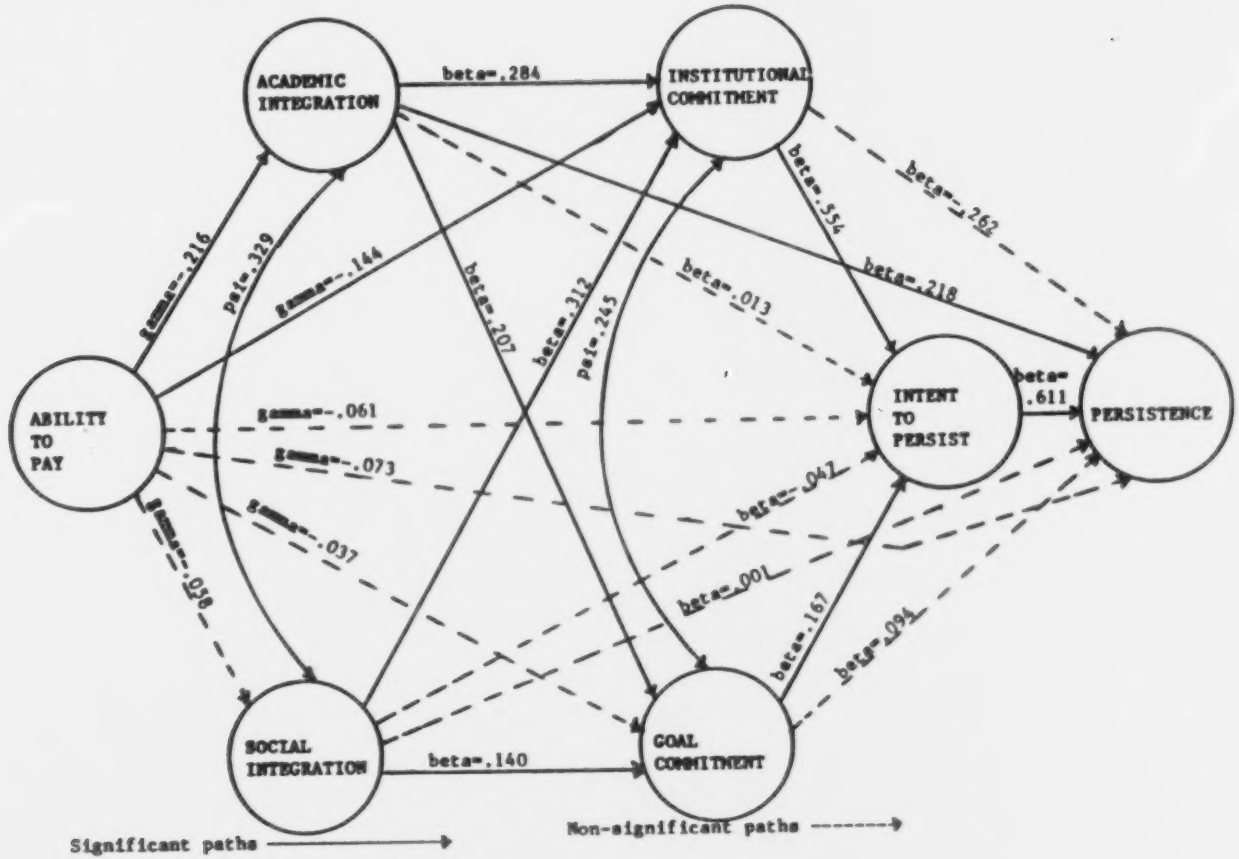
The Psi coefficient for the hypothesized non-causal relationship between Academic Integration and Social Integration was .329. The T-value for the parameter estimate was 7.952, far exceeding the desired value of 2.0. The standardized regression weight supports the hypothesis reflected in the quantitative model. Although there is a relationship between Academic and Social Integration as noted in Tinto's (1975, 1987) theoretical framework, the relationship is not causal in nature. The two variables are related, but not causally.

Similarly, the hypothesized relationship between Institutional Commitment and Goal Commitment (Psi=.245) was also found significant (T-value=5.633). Again, while there is a definite relationship between the two variables in the structural model, the relationship is not one of causality.

Measures of Goodness of Fit

The chi-square for the overall model (see Figure 2) was 96.35 (df=59, p=.002). The Goodness of Fit Index was .985, the Adjusted Goodness of Fit .974, and the Root Mean Square Residual .061. The Total Coefficient of Determination for the overall model was .086. All measures of the overall strength of the structural model indicated that the hypothesized causal model in the study represented a plausible model of persistence. An examination of the fitted residuals revealed that none of the fitted residuals exceeded 2.0. The largest fitted residual was .258. Furthermore, examination of the stemleaf plot and the Q

Figure 2. Full Statistical Model.



plot of standardized residuals (see Figure 3) revealed appropriate distributions in both. Nearly all of the residuals in the Q plot fell in line with the desired distribution for standardized residuals. Although the chi-square was not significant (p=.002), all other measures of goodness of fit indicated a good overall fit of the hypothesized quantitative model.

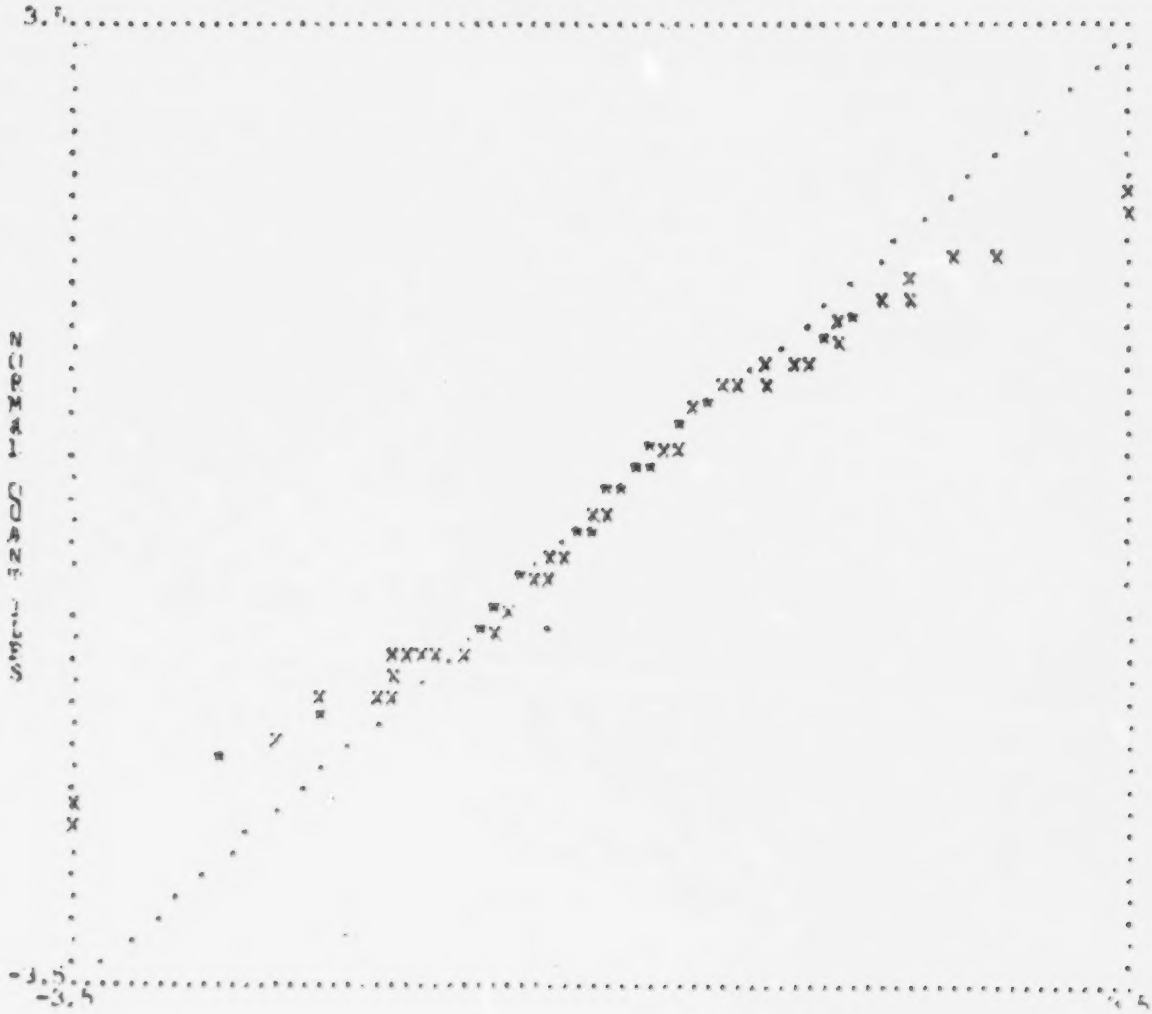
DISCUSSION AND CONCLUSIONS

Implications for Institutional Intervention

There are several factors that are forcing institutions of higher education to examine their enrollment practices and to understand and document the processes affecting college persistence. Public institutions in those states where state budget allocations are tied to enrollment are finding it difficult to maintain their operations unless programs, aimed at retaining students, are developed. Moreover, the declining number of high school graduates has added to the concern over enrollment rates. Both state and local governments are stressing the importance of retention programs. In some states (e.g., Texas), funding programs that reward institutions for their successful retention and graduation rates are likely to be implemented in the near future. Demographic changes and college-going rates for minority students have also tended to force institutions to examine their retention statistics more carefully.

Given the above environment, it is understandable why college administrators are asking for more information related to retention and graduation rates and how such statistic could be

Figure 3. QPLOT OF STANDARDIZED RESIDUALS



improved. It is the later function, however, that has proven most difficult to identify. One of the major purposes of this study was to identify a retention model for the institution that could facilitate a better understanding of retention behavior. With continued refinement and testing, the model could be used in developing an early warning system that identifies students with a "high-risk" of dropping out. It is anticipated that freshmen can be administered a survey at the beginning of the spring semester as part of an early-warning system. Using the survey data identified from the model in this study, academic advisors and financial aid officers could identify those students who are at "high risk" and provide intervention strategies aimed at enhancing their chances to persist.

The results of this study suggest that both Academic and Social Integration play a major role in enhancing students' chances to remain at their respective institutions. In an urban commuting environment, creating opportunities for both academic and social integration is a difficult challenge to meet. At the study institution, almost 70 percent of the students lived in housing other than residence halls and 75 percent of the students had part-time jobs. Administrators of support systems at commuter campuses should increase opportunities for students to interact with one another. Informal interactions should be encouraged through classroom and non-classroom activities. Institutions should have evening programs, child care, and academic advising in the evening for their commuting student populations. Social opportunities should be provided within the time constraints

imposed upon working-commuting students.

At most institutions, the percentage of students receiving financial aid has increased dramatically. At the institution under study, the percentage of students receiving aid has gone up 75% in the last four years. Although the effect of ability to pay on persistence was found to be indirect through academic integration and institutional commitment, the relationship between ability to pay and academic integration and institutional commitment was direct. Results suggest that the institution can have leverage in facilitating academic integration and institutional commitment, which have been found to have an impact on persistence, by addressing the student's ability to pay. As colleges costs continue to increase and the student's ability to pay is affected, institutions may begin to experience a decline in their retention rates.

Implications for Future Research

Theoretically, several findings substantiated the incorporation of factors previously excluded from conceptual frameworks on persistence. While the effect of ability to pay was found to be indirect on persistence, it nevertheless supported the hypothesis that this factor exerts an influence in the dropout decisions among commuter students. Moreover, the results of the study not only validated the constructs identified in Tinto's (1975, 1987) Student Integration Model, but the use of Tinto's model to study attrition at urban institutions.

In regards to issues of reliability and validity, the findings in the present study supported the use of items and

scales (Pascarella & Terenzini, 1980; Bean, 1980) which were modified to address the issues of measurement or misspecification errors found in other attrition studies operationalizing the factors. Both exploratory and confirmatory factor analysis and parameter estimates from structural models indicated that, although items and scales utilized in previous studies were reliable and valid, revisions and additions could increase the reliability coefficients and construct validity of variables identified in Tinto's model. One reason for the inconsistencies found among relationships in retention studies, or the lack of any relationships among variables, may not be due to the lack of any significant relationships, but rather, that errors in measurement may contribute to reducing the variance explained in structural equations. It was determined that single item scores, representing multiple indicators of latent constructs in the study, served as better measures of factors in the causal model rather than composite scores formed by related items in the questionnaire.

Furthermore, the results of the study supported the hypothesized relationship advanced by Tinto (1987) that there exists a compensatory relationship between academic and social integration. The relationship is hypothesized to be noncausal in nature. This relationship between integration factors has been tested by Stage (1989), where it was hypothesized that academic integration exerted a causal effect on social integration, and by Nora (1990), where a reciprocal causation was hypothesized between the two constructs. Moreover, the results further

supported the theory that there also existed a compensatory relationship between institutional and goal commitments. It is believed that the interrelationship between the two commitment factors may be related to the lack of direct effects by both constructs on persistence. The reverse transfer phenomena manifested by commuter students from four-year to two-year institutions may be attributed to the fact that commuter students do not have a sense of commitment to their four-year institutions and possibly to an educational goal. Attending a four-year college may be more on an trial basis without any commitment to attaining a degree from a specific institution. Although neither construct has a direct impact on persistence, both institutional and goal commitments are interrelated. Again, the compensatory relationship between commitment factors has been hypothesized by Bean and Vesper (1990) and Stage (1989) and tested by Nora (1990) in which both measures were believed to be multiple indicators of initial commitments.

Finally, research on persistence has typically been influenced by the categorical nature of the persistence variable. Most studies on persistence have tested quantitative models utilizing a maximum likelihood solution on a covariance matrix where the dependent variable is non-normally distributed in the data set. Deriving a polyserial correlation matrix and asymptotic variances and covariances through PRELIS, and utilizing a weighted least square (WLS) solution which is more appropriate for handling non-normally distributed discrete variables, makes it possible to better measure the effects hypothesized in the

causal model.

Concluding Remarks

In the foreseeable future, retention and graduation rates will likely receive greater national, state, and local attention. The increased accountability from external agencies may force institutions to pay even closer attention to this area. The results of this study have implications for policy changes in the area of financial aid, student advising and intervention strategies in higher education institutions and, most of all, stress the need to bring together different units on campuses (e.g., faculty, academic staff, support services, offices of financial aid) to address the issue of retention.

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